OCO-2 Status
July 13, 2017

David Crisp for the OCO-2 Science Team

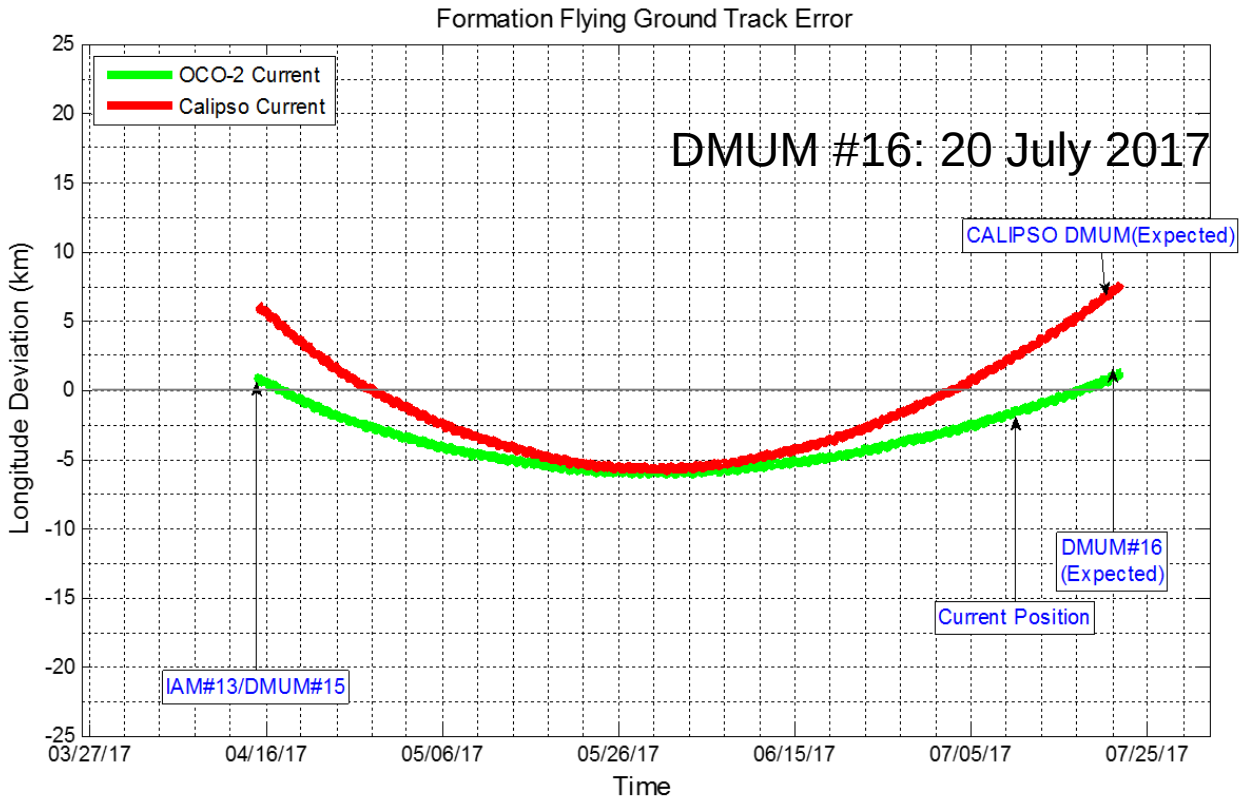
Jet Propulsion Laboratory, California Institute of Technology

Overview

- Observatory Status: Nominal
  - Drag Make-up Maneuver (DMUM) planned for July 20
- Instrument Status:
  - Last decon: March 1, 2017 Decon.
  - An instrument reset and decon is currently being planned for late July or early August
- V8 Testing and Implementation
  - The Level 2 B8r production plans will be reviewed at a Change Control Board (CCB) meeting on Thursday July 13. Pending approval, Level 2 B8r processing will begin after that meeting
- Publications
  - The Science/GRL Special Collection is IN PRESS
- Meetings and Events supported by OCO-2 Team Members

OCO-2 and CALIPSO Ground Tracks

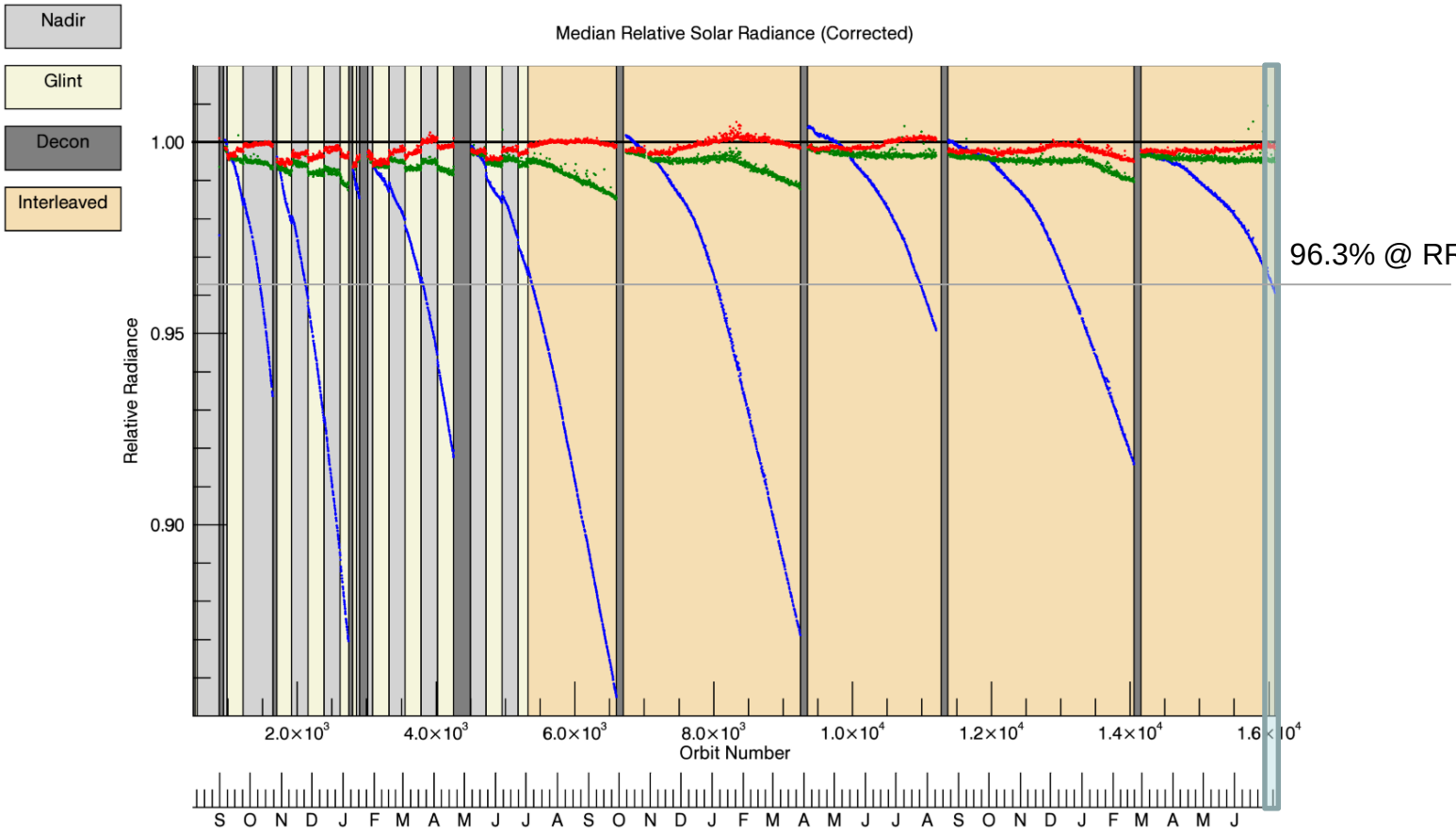
EAST



WEST

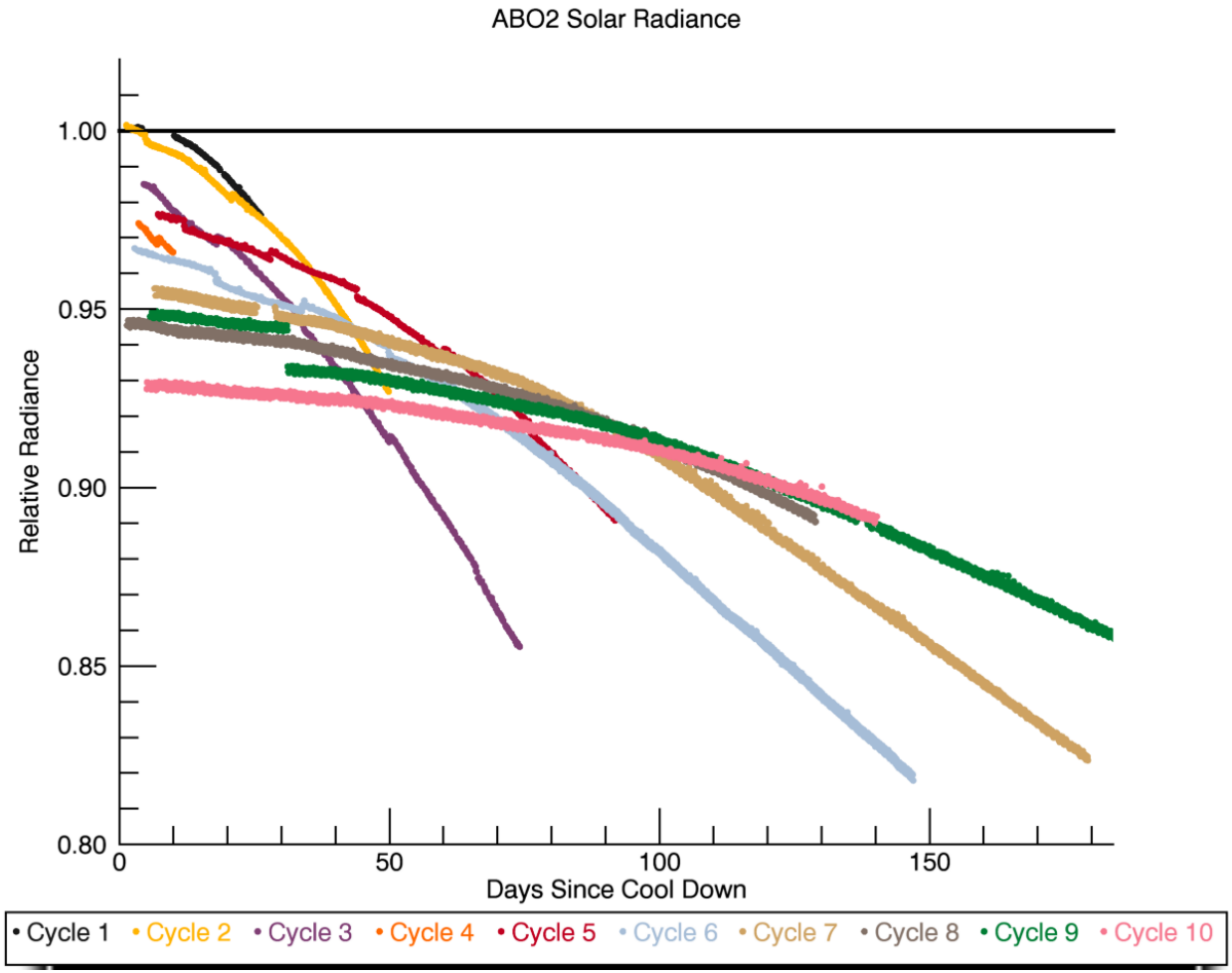
The OCO-2 Nadir and CALIPSO ground tracks have remained well aligned since the last Inclination Adjust Maneuver in April. The next Drag Make-up Maneuver (DMUM) is tentatively scheduled for July 20.

OCO-2 Instrument Trending



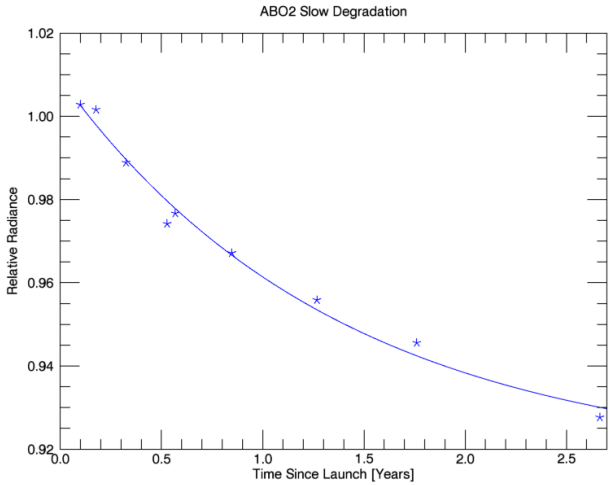
Rate of ice accumulation continues to decrease. An Instrument and Decon are currently being planned and could interrupt observations later in July or in early August.

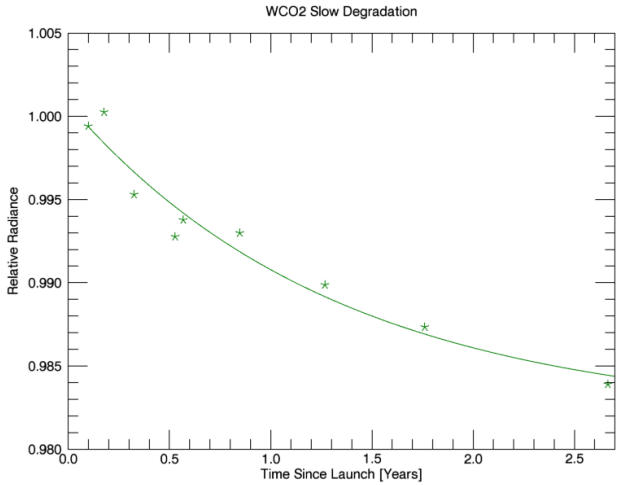
FPA Ice Accumulation Rate

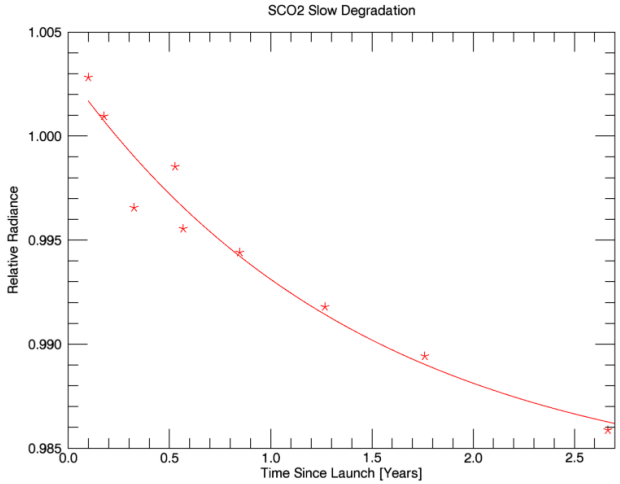


The ice accumulation rate on the ABO2 FPA continues to decrease with time.

Slow Degradation of the Solar Diffuser

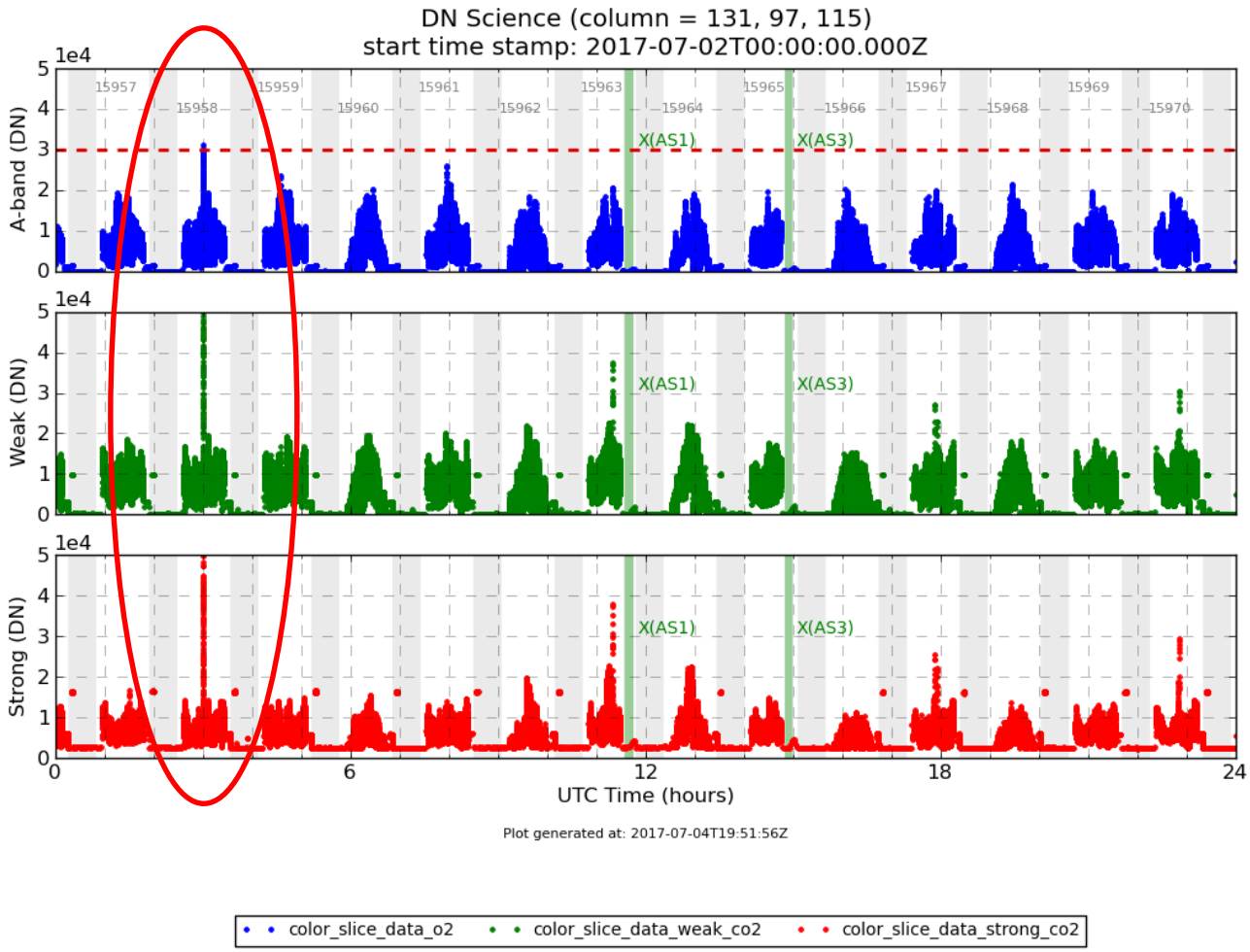


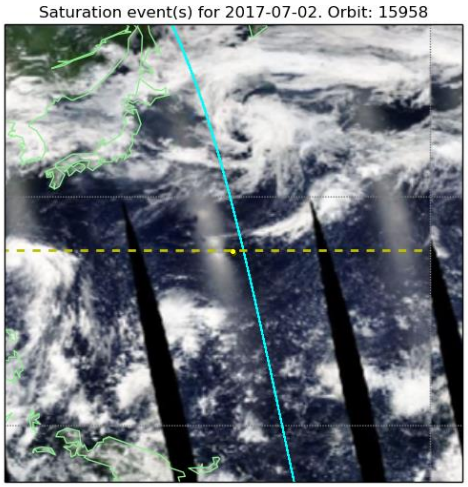




The slow degradation of the solar diffuser is now being tracked separately.

Possible Saturation Event: July 2, 2017, Orbit 15958

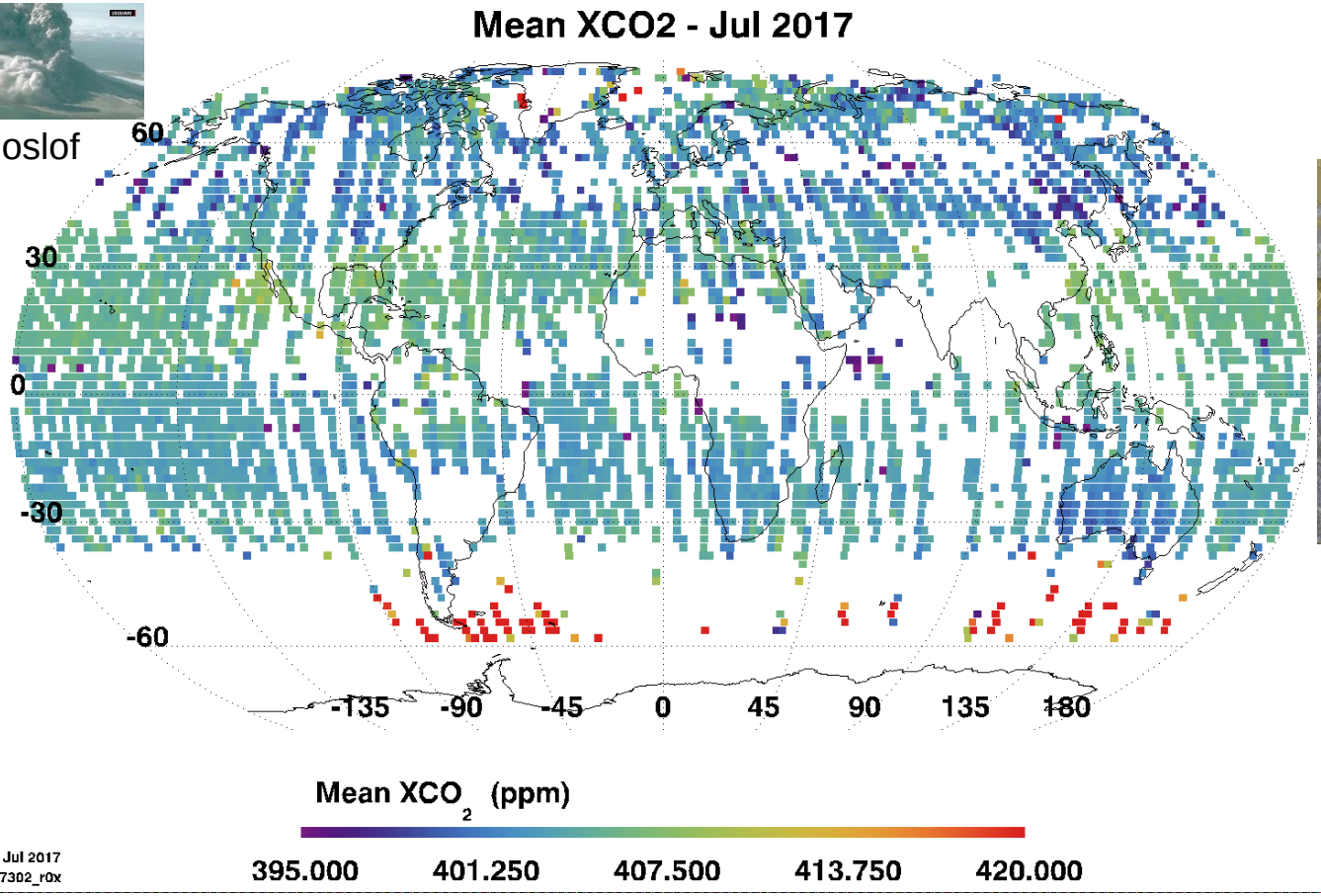


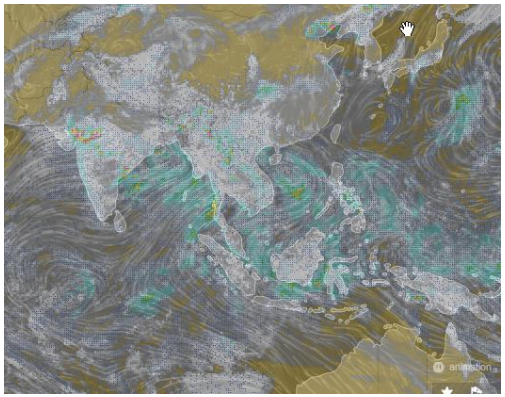


A bright ocean glint exposure southeast of Japan exceeded the saturation warning limits. These events are more common during the summer due to the sun's beta-angle.

July X_{CO2} Data (forward stream)

Bogoslof





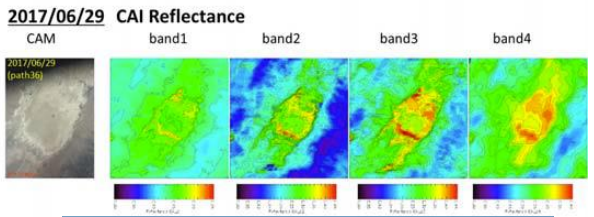
July 13 cloud forecast from www.windy.com

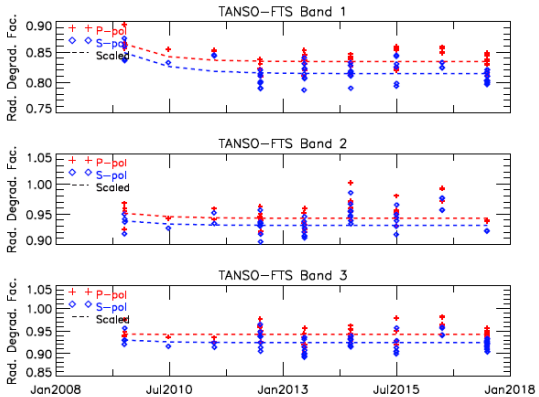
The first 2 weeks of July is looking as expected. Note the impact of the summer monsoon over Asia. High XCO2 values over Southern Ocean are under investigation.

This might be the LAST Version 7 Map that we distribute.

The 2017 Railroad Valley Campaign was a Success

- Team deployed in RRV on 25-30 June
  - Ground based data collected on 25 (“training day”), 26, 27, 29 and 30 June
  - No rain and cloud-free skies on 25-23 June
    - Slightly hazy on 6/26
  - Alpha Jet not available
- OCO-2 Target Observations
  - 2017-06-25 14:05:28 PDT (2017-06-25 21:05:28 UTC)
  - 2017-06-27 13:53:08 PDT (2017-06-27 20:53:08 UTC)
  - 2017-06-29 13:41:00 PDT (2017-06-29 20:41:00 UTC)
- GOSAT Target Observations
  - Path 36 (east: forward scattering) on 2017-06-26 and 2017-06-29 (“Golden Day”)
  - Path 37 (west, backscattering)on 2017-06-27 (Silver day) and 2017-06-30 29
- Followed by a 1-day Salton Sea Campaign





Preliminary GOSAT Degradation

Aircraft Campaigns of Interest to GOSAT and OCO-2

- ASCENDS Alaska Campaign: July 27 – August 8
  - The first and last days are transit days (typically with measurements).
  - The Alaska deployments will be between those two dates.

- ACT-America Campaign#3: October 3 – November 13.
  - LaRC: 2-16 October
  - Lincoln Nebraska: 17-30 October
  - Shreveport, Louisiana: 31 October – 13 November
  - The ACT-America calendar is here: https://actamerica.larc.nasa.gov/calendar.html

- ATom: 1-26 October
  - Preceded by shakedown and test flights from September 12-28.
  - The ATom calendar is here: https://espo.nasa.gov/home/atom/calendar/2017-09

Publications Statistics

By 11-Jul-2017:

- 2014: OCO-2: 7 refereed papers, 1 book chapter
- 2015: OCO-2: 8 refereed papers
- 2015: ACOS: 3 refereed papers, 1 book chapter
- 2016: OCO-2: 18 refereed papers
- 2016: ACOS: 12 refereed papers
- 2017: OCO-2: 13 refereed papers, 7 in press (5 papers Science/GRL Collection + Worden et al., and Chevallier et al.)
- 2017: ACOS: 2 refereed papers

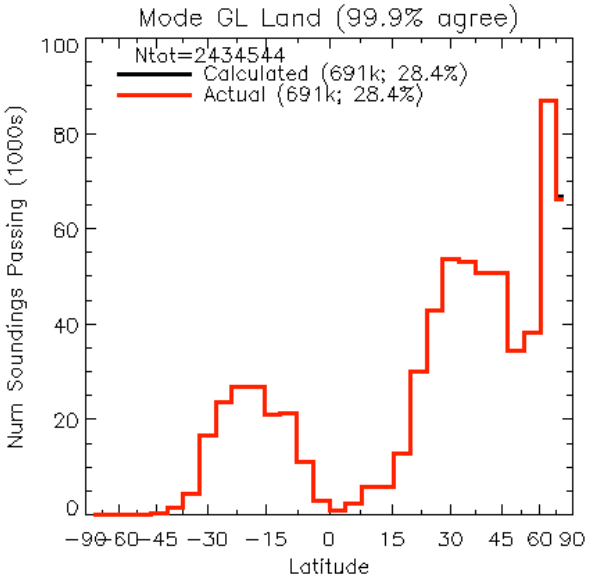

Ongoing Work for V8
Annmarie Eldering

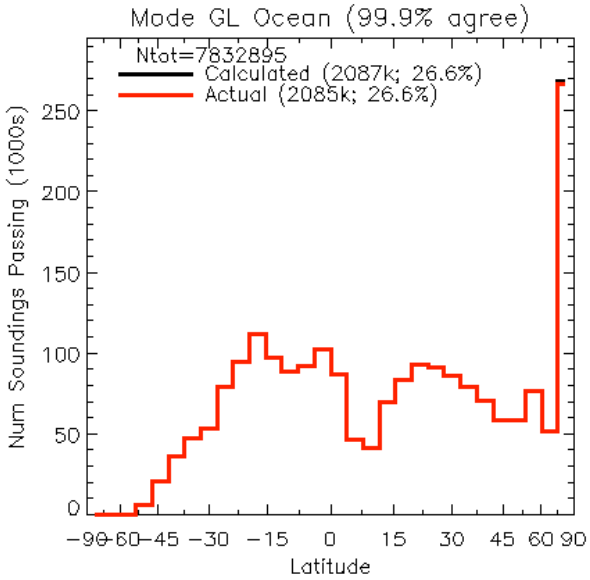
V8 data product development

- Updated data product being prepared. Working towards a complete reprocessing by end of Sept.
  - Updated radiometric calibration
  - Changes to retrieval process, including addition of stratospheric aerosols and more realistic treatment of how land surface reflect
  - L1b data product are being produced
  - L2 data production expected to start at the end of this week, expected to take 3 months
  - Using OCO-2 cluster, NASA supercomputer, and Amazon cluster
  - Bias Correction and data screening in development. Aiming to complete that work by the end of July
  - Lite file production to follow.

V8 will have more data throughput

- Improvements to cloud screening will
  - Increase data throughput from 18% to 24% of all measurements
  - Extend latitude range of data
- Figure below shows summer month throughput, on equal area scale. New scheme will let through more high latitude data and ocean data then v7

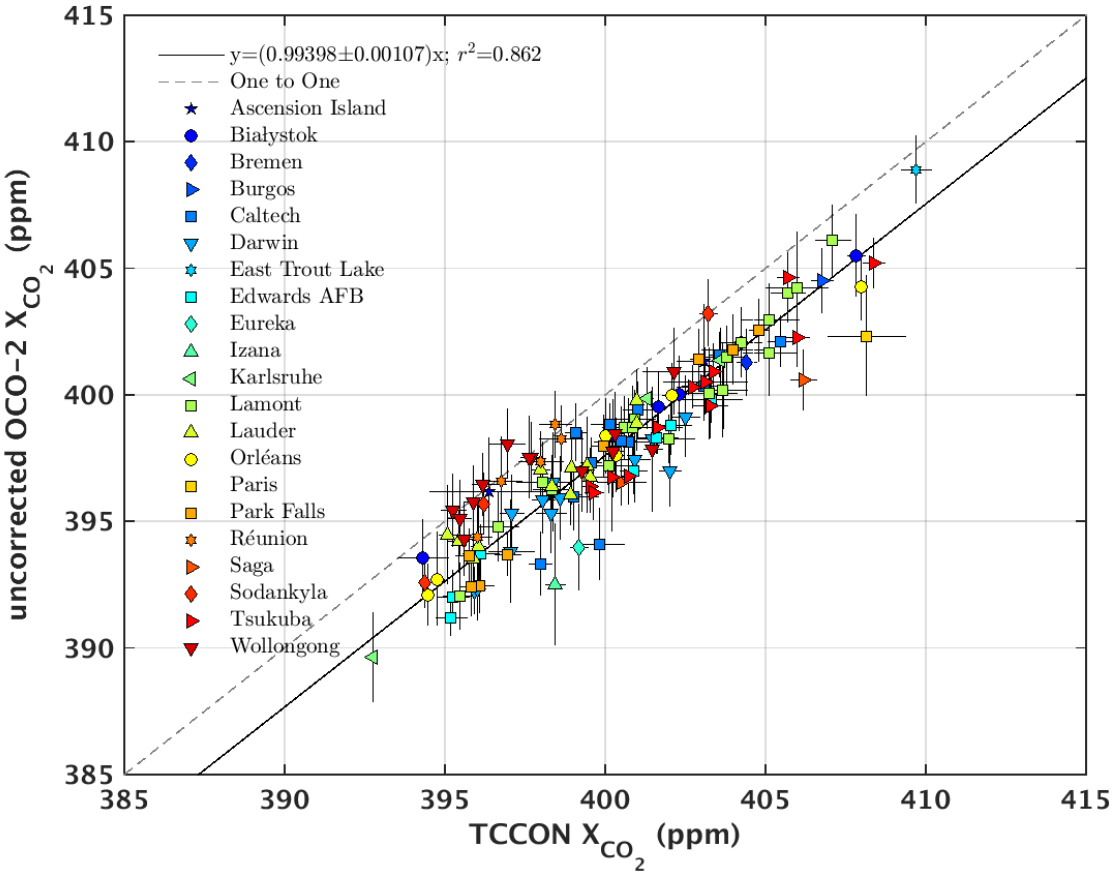




TCCON analysis underway

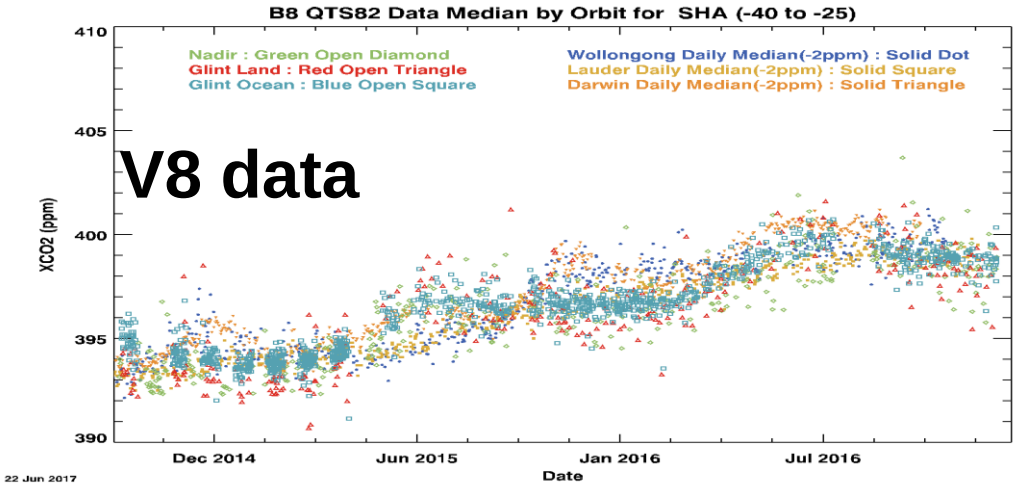
- Target data are critical to characterizing the dataset.
- We are in early stages of assessment.
- The v8 and v7 data, before any bias correction, have similar overall scatter relative to the TCCON target data, but the v8 data yield is much higher
- Ongoing analysis focuses on the key drivers of bias in the target data.

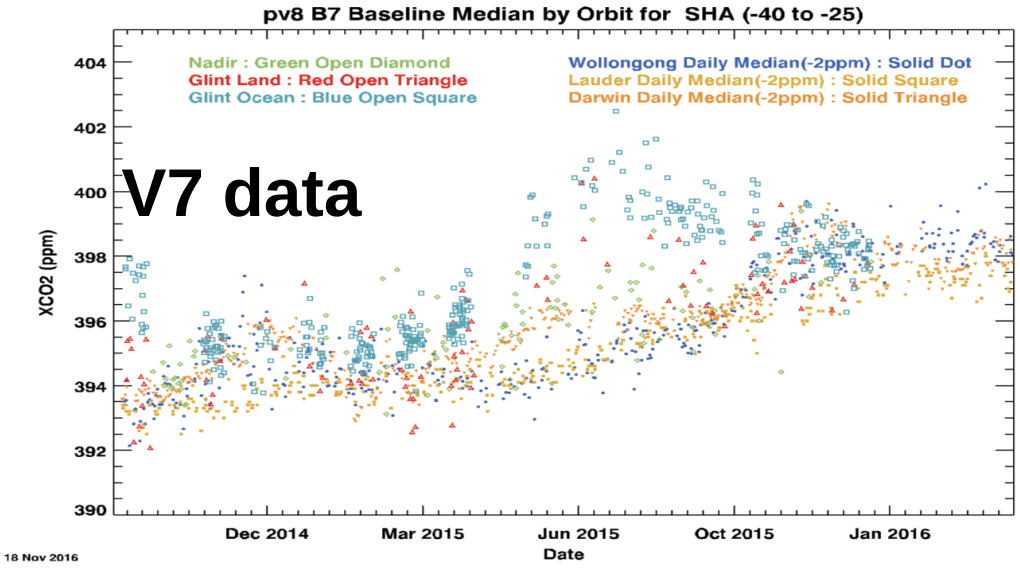
TCCON and OCO-2 data from targets, before bias correction is applied to v8 dataset.



Timeseries of new v8 dataset (VERY prelim bias correction)

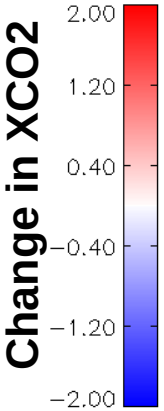
- New v8 data from nadir and glint are also compared to the TCCON measurements.
- In the southern hemisphere, we see that the time dependence of TCCON is well captured with the B8 dataset.
- In v7, there were seasonal disagreements in this region.
- The addition of stratospheric aerosols significantly reduced the bias.

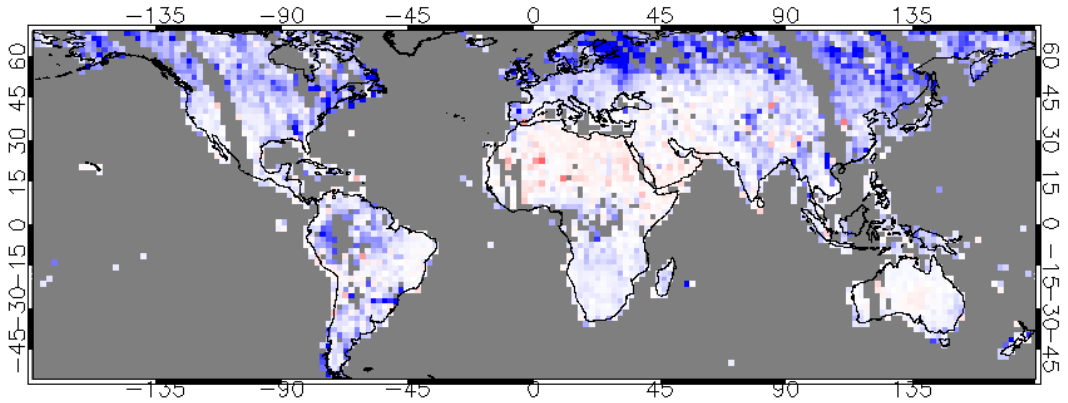




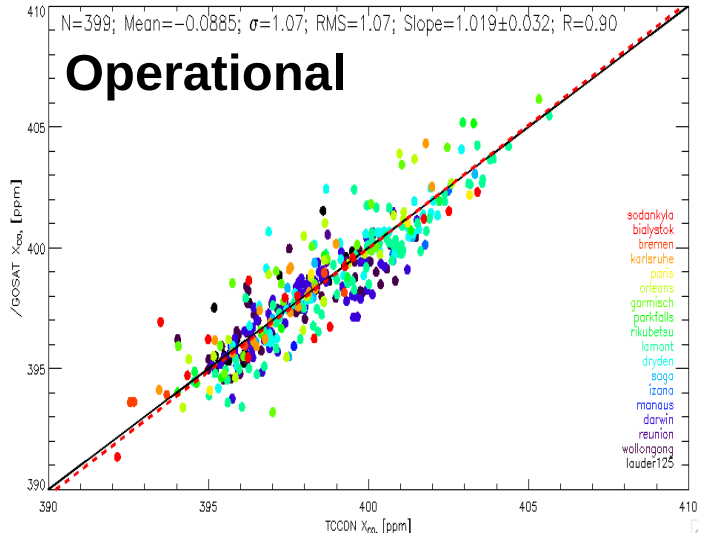
Stratospheric Aerosols – effect on Land

Stratospheric aerosols improve the fits over land as well as ocean (O'Dell et al.)

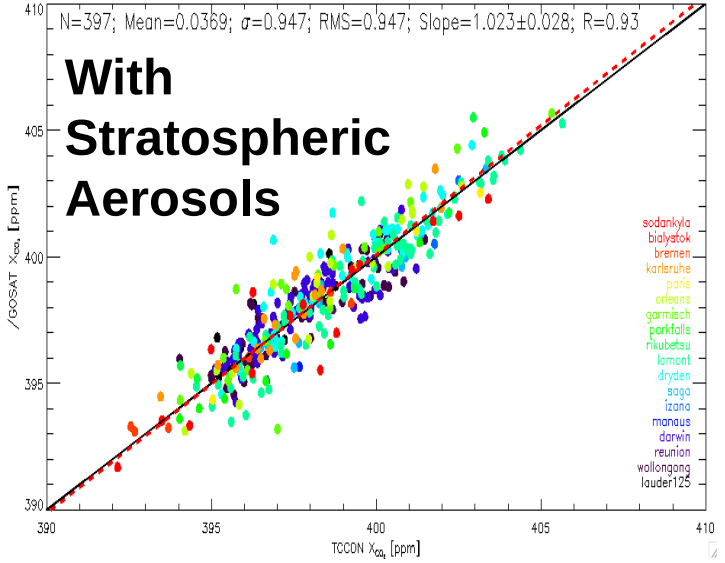




	Site L25	Site Wol	Site Reu	Site Dar	Site Man	Site Iza	Site Sag	Site Dry	Site Lam	Site Rik	Site Pkf	Site Ger	Site Orl	Site Pas	Site Kar	Site Bre	Site Bia	Site Sod
N	23	47	4	88	1	3	12	46	76	5	8	21	23	4	17	6	13	2
Mean	0.25	−0.22	0.51	−0.25	−1.76	−0.96	−0.41	0.09	−0.48	0.69	0.03	0.56	0.39	−0.37	0.44	0.19	−0.32	1.88
σ	0.96	1.10	1.01	0.83	NaN	0.76	0.87	1.09	0.92	1.27	0.93	1.46	1.31	0.80	0.88	0.79	1.25	2.16
R	0.85	0.84	0.90	0.86	NaN	0.88	0.92	0.87	0.95	0.95	0.98	0.89	0.90	0.98	0.96	0.98	0.92	−1.00
a	1.16	0.81	1.80	0.97	NaN	1.51	0.94	1.07	1.11	0.99	1.18	1.14	1.16	1.02	1.17	0.80	0.90	−2.64

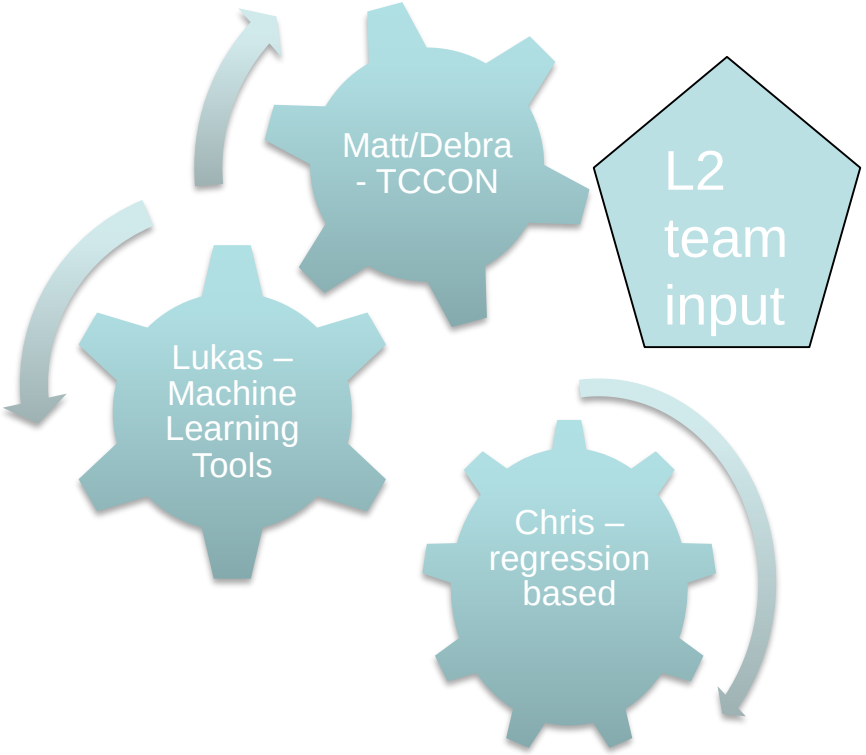


	23	47	3	88	1	3	12	46	76	5	8	21	22	4	17	6	13	2
Mean	0.23	−0.09	−0.22	0.12	−2.04	−0.42	−0.40	0.39	−0.31	0.73	−0.77	0.44	0.44	−0.16	0.46	−0.10	−0.30	−0.51
σ	0.64	0.94	0.53	0.81	NaN	0.89	0.73	0.92	0.80	1.35	1.09	1.31	1.06	0.76	0.83	0.65	1.31	0.74
R	0.92	0.89	0.93	0.87	NaN	0.85	0.95	0.91	0.96	0.95	0.97	0.91	0.93	0.98	0.94	0.98	0.91	−1.00
a	1.02	0.84	1.19	0.97	NaN	1.59	1.01	1.05	1.10	0.99	1.14	1.11	1.13	1.01	1.07	0.84	0.91	−0.24



Ongoing Analysis – Bias Correction

- Coordinated team effort underway
  - Decide on variables for screening
  - Decide on variables for bias correction
  - Need to develop consensus on BC eqn (for form and coefficients)



- Seeing many familiar variables (dP, co2_grad_del, AOD……)
- Double checking for airmass dependence
- Still need to attack mode to mode scaling
- Also adding some variables to analysis like declocking (may catch some cloud effects)

Upcoming activities

OCO-2 Team Activities

- Recent Meetings
  - 20-25 May: JpGU, Chiba, Japan
  - 23-24 May: NOAA ESRL GMD Annual Meeting, Boulder CO
  - 6-8 June: IWGGMS, Helsinki
  - 11-16 June: CGMS-45 (Carbon Session on 16 June)
  - 28-30 June: CEOS AC-VC, CNES HQ, Paris
- Upcoming Meetings
  - 6-11 August, AOGS, Singapore
  - 21-25 August, ICDC10, Interlaken, Switzerland
  - 11-14 September, 2017 CEOS SIT Technical Workshop, Frascati, Italy
  - 2-6 October, EUMETSAT-2017, Rome, Italy
  - 25-27 October 2017, OCO-2 Science Team Meeting, NCAR, Boulder, CO, USA
  - 11-15 December, 2017: AGU Fall Meeting, New Orleans, LA, USA